



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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In re application of: TAUBER et. al

Serial No.: 09/845,108

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For: RARE EARTH METAL COMPOUNDS FOR USE IN HIGH CRITICAL  
TEMPERATURE THIN FILM SUPER-CONDUCTORS, FERROELECTRICS,  
PYROELECTRICS, PIEZOELECTRICS, AND HYBRIDS

Attorney Docket No.: CECOM-5469

**AMENDMENTS TO THE CLAIMS**

Sir, in response to the Office Action dated May 29, 2003, Paper No. 15 and in accordance with enclosed Remarks and the Revised Amendment Format, please amend the above-identified application as follows:

1-4. Cancel these claims.

5. (Withdrawn) The dielectric substrate, according to claim 3, wherein:

said dielectric substrate is constructed in a thin film structure;

said dielectric substrate having a density GM/CC of 6.87;

said dielectric substrate having a low dielectric constant between 14.3 and 15.9; and

said dielectric substrate having a low dielectric loss less than  $1 \times 10^{-3}$ .

6. Cancelled.

7. (Currently Amended) ~~A The dielectric substrate, according to claim 6, of the general formula  $Sr_2RESbO_6$ , further comprising:~~

~~said RE being Ytterbium;~~

~~said dielectric substrate being constructed of  $Sr_2YbSbO_6$ ;~~

~~said general formula including an  $Sb^{5+}$  constituent atom with a polarizability of about  $1.2 \times 10^{-3}$ ;~~

~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ C$  and  $1600^\circ C$ ;~~

said dielectric substrate is constructed in a bulk form;  
said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

said dielectric substrate having a low dielectric constant of 5.1; and

5      said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$  without a phase transition.

8. (Withdrawn) The dielectric substrate, according to claim 6, wherein:

said dielectric substrate is constructed in a thin film structure;

10      said dielectric substrate having a density GM/CC of 6.86;

said dielectric substrate having a low dielectric constant between 4.8 and 5.4; and

said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$ .

9. Canceled.

15      10. (Currently Amended) A ~~The dielectric substrate, according to claim 9, of the general~~  
formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:

said RE being Thulium;

said dielectric substrate being constructed of  $\text{Sr}_2\text{TmSbO}_6$ ;

20      said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;

said dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{C}$  and  $1600^\circ \text{C}$ ;

said dielectric substrate is constructed in a bulk form;

25      said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

said dielectric substrate having a low dielectric constant of 10.0; and

said dielectric substrate having a low dielectric loss of  $2.0 \times 10^{-3}$  without a phase transition.

11. (Withdrawn) The dielectric substrate, according to claim 9, wherein:

said dielectric substrate is constructed in a thin film structure;

said dielectric substrates having a density GM/CC of 6.77;

said dielectric substrate having a low dielectric constant between 9.5 and 10.5; and

said dielectric substrate having a low dielectric loss of  $2.0 \times 10^{-3}$ .

12. Canceled.

13. (Currently Amended) ~~A The dielectric substrate, according to claim 12, of the~~  
general formula  $\text{Sr}_2\text{REShO}_6$ , further comprising:

said RE being Erbium;

said dielectric substrate being constructed of  $\text{Sr}_2\text{ErShO}_6$ ;

said general formula including an  $\text{Sh}^{5+}$  constituent atom with a polarizability of about  $1.2$

$\text{\AA}^3$ ;

said dielectric substrate being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ$

$^\circ\text{C}$ ;

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline

structure;

said dielectric substrate having a low dielectric constant of 5.3; and

said dielectric substrate having a low dielectric loss of less than  $1.6 \times 10^{-3}$  without a phase transition.

14. (Withdrawn) The dielectric substrate according to claim 12 wherein:

said dielectric substrate is constructed in a thin film structure;

said dielectric substrate having a low dielectric constant of 4.1; and

said dielectric substrate having a low dielectric loss of  $3.2 \times 10^{-3}$ .

15. Canceled

16. (Currently Amended) A ~~The dielectric substrate, according to claim 15, of the~~  
~~general formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:~~

5 ~~said RE being Holmium;~~

~~said dielectric substrate being constructed of  $\text{Sr}_2\text{HoSbO}_6$ ;~~

~~said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;~~

~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ\text{C}$ ;~~

10 ~~said dielectric substrate is constructed in a bulk form;~~

~~said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;~~

~~said dielectric substrate having a low dielectric constant of 11.6; and~~

15 ~~said dielectric substrate having a low dielectric loss of about  $3.1 \times 10^{-3}$  without a phase transition.~~

17. (Withdrawn) The dielectric substrate, according to claim 15, wherein:

~~said dielectric substrate is constructed in a thin film structure;~~

20 ~~said dielectric substrates having a density GM/CC of 6.64;~~

~~said dielectric substrate having a low dielectric constant between 11.1 and 12.2; and~~

~~said dielectric substrate having a low dielectric loss of  $3.1 \times 10^{-3}$ .~~

18. Canceled

25 19. (Currently Amended) A ~~The dielectric substrate, according to claim 18, of the~~  
~~general formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:~~

~~said RE being Dysprosium;~~

~~said dielectric substrate being constructed of  $\text{Sr}_2\text{DySbO}_6$ ;~~

said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;

said dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{C}$  and  $1600^\circ \text{C}$ ;

said dielectric substrate is constructed in a bulk form;  
said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

said dielectric substrate having a low dielectric constant of 11.2; and

said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$  without a phase transition.

20. (Withdrawn) The dielectric substrate, according to claim 18, wherein:

said dielectric substrate is constructed in a thin film structure;

said dielectric substrate having a density GM/CC of 6.56;

said dielectric substrate having a low dielectric constant between 10.6 and 11.8; and

said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$ .

21. Canceled.

22. (Currently Amended) ~~A The dielectric substrate , according to claim 21, of the~~  
general formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:

said RE being Terbium;

said dielectric substrate being constructed of  $\text{Sr}_2\text{TbSbO}_6$ ;

said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;

said dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{C}$  and  $1600^\circ \text{C}$ ;

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

said dielectric substrate having a low dielectric constant of 12.9; and

said dielectric substrate having a low dielectric loss of  $1.4 \times 10^{-3}$  without a phase

5 transition.

23. (Withdrawn) The dielectric substrate, according to claim 21, wherein:

said dielectric substrate is constructed in a thin film structure;

said dielectric substrate having a low dielectric constant of 4.6; and

10 said dielectric substrate having a low dielectric loss of  $4.0 \times 10^{-3}$ .

24. Canceled.

25. (Currently Amended) ~~The dielectric substrate, according to claim 21, of the~~  
15 general formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:

said RE being Yttrium;

said dielectric substrate being constructed of  $\text{Sr}_2\text{YSbO}_6$ ;

said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \times 10^{-30}$ ;

20 said dielectric substrate being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ\text{C}$ ;

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

25 said dielectric substrate having a low dielectric constant of 7.1; and

said dielectric substrate having a low dielectric loss of  $1.4 \times 10^{-3}$  without a phase  
transition.

26. (Withdrawn) The dielectric substrate, according to claim 24, wherein:

said dielectric substrate is constructed in a thin film structure;  
said dielectric substrate having a density GM/CC of 5.91;  
said dielectric substrate having a low dielectric constant between 6.7 and 7.5; and  
said dielectric substrate having a low dielectric loss of about  $1.4 \times 10^{-3}$ .

5

27. Canceled.

28. (Currently Amended) ~~A The dielectric substrate, according to claim 27, of the~~  
~~general formula  $\text{Sr}_2\text{RE}\text{SbO}_6$ , further comprising:~~

10     ~~said RE being Lanthanum;~~  
      ~~said dielectric substrate being constructed of  $\text{Sr}_2\text{LaSbO}_6$ ;~~  
      ~~said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \times 10^{-3}$ ;~~  
      ~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ\text{C}$ ;~~

15

~~said dielectric substrate~~ is constructed in a bulk form;  
said dielectric substrate having an ordered perovskite cubic crystalline structure;  
said dielectric substrate having a low dielectric constant of 16.3; and  
said dielectric substrate having a low dielectric loss of  $3.8 \times 10^{-3}$  ~~without a phase~~

20     ~~transition.~~

29. (Withdrawn) The dielectric substrate according to claim 27 wherein:

said dielectric substrate is constructed in a thin film structure;  
said dielectric substrate having a density GM/CC of 5.19.  
25     said dielectric substrate having a low dielectric constant between 14.5 and 16.1; and  
      said dielectric substrate having a low dielectric loss of about  $3.8 \times 10^{-3}$ .

30. Canceled.

31. (Currently Amended) ~~A The dielectric substrate , according to claim 30, of the~~  
~~general formula  $\text{Sr}_2\text{REShO}_6$ , further comprising:~~

~~said RE being Gadolinium;~~

~~said dielectric substrate being constructed of  $\text{Sr}_2\text{GdShO}_6$ ;~~

5 ~~said general formula including an  $\text{Sh}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;~~

~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{C}$  and  $1600^\circ \text{C}$ ;~~

~~said dielectric substrate is constructed in a bulk form;~~

10 ~~said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;~~

~~said dielectric substrate having a low dielectric constant of 12.1; and~~

~~said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$  without a phase transition.~~

15 32. (Withdrawn) The dielectric substrate, according to claim 30, wherein:

~~said dielectric substrate is constructed in a thin film structure;~~

~~said dielectric substrate having a low dielectric constant of 6.0; and~~

~~said dielectric substrate having a low dielectric loss of  $9.0 \times 10^{-3}$ .~~

20 33. Canceled.

34. (Currently Amended) ~~A The dielectric substrate , according to claim 33, of the~~  
~~general formula  $\text{Sr}_2\text{REShO}_6$ , further comprising:~~

25 ~~said RE being Samarium;~~

~~said dielectric substrate being constructed of  $\text{Sr}_2\text{SmShO}_6$ ;~~

~~said general formula including an  $\text{Sh}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;~~

~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{C}$  and  $1600^\circ \text{C}$~~



C;

said dielectric substrate is constructed in a bulk form;

said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

5        said dielectric substrate having a low dielectric constant of 13.6; and

said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$  without a phase transition.

35. (Withdrawn) The dielectric substrate, according to claim 33, wherein:

10        said dielectric substrate is constructed in a thin film structure;

said dielectric substrate having a low dielectric constant of 8.8; and

said dielectric substrate having a low dielectric loss of  $9.0 \times 10^{-3}$ .

36. Canceled.

15        37. (Currently Amended) ~~A The dielectric substrate according to claim 36, of the general formula  $\text{Sr}_2\text{REShO}_6$ , further comprising:~~

said RE being Praseodymium;

said dielectric substrate being constructed of  $\text{Sr}_2\text{PrShO}_6$ ;

20        said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ;

said dielectric substrate being heated for at least 20 hours at between  $1400^\circ \text{C}$  and  $1600^\circ$

C;

said dielectric substrate is constructed in a bulk form;

25        said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;

said dielectric substrate having a low dielectric constant of 10.9; and

said dielectric substrate having a low dielectric loss of  $2.2 \times 10^{-3}$  without a phase transition.

38. (Withdrawn) The dielectric substrate, according to claim 36, wherein:  
said dielectric substrate is constructed in a thin film structure;  
said dielectric substrates having a density GM/CC of 6.02;  
5 said dielectric substrate having a low dielectric constant between 10.4 and 11.4; and  
said dielectric substrate having a low dielectric loss of about  $2.2 \times 10^{-3}$ .

39. Canceled.

10 40. (Currently Amended) ~~The dielectric substrate, according to claim 39, of the~~  
~~general formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:~~  
~~said RE being Europium;~~  
~~said dielectric substrate being constructed of  $\text{Sr}_2\text{EuSbO}_6$ ;~~  
~~said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2$~~   
15  ~~$\text{\AA}^3$ ;~~  
~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ$~~   
 ~~$\text{C}$ ;~~  
~~said dielectric substrate is constructed in a bulk form;~~  
said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline  
20 structure;  
said dielectric substrate having a low dielectric constant of 14.6; and  
said dielectric substrate having a low dielectric loss of less than  $1.0 \times 10^{-3}$  ~~without a phase~~  
~~transition.~~

25 41. (Withdrawn) The dielectric substrate, according to claim 39, wherein:  
said dielectric substrate is constructed in a thin film structure;  
said dielectric substrate having a low dielectric constant of 4.6; and  
said dielectric substrate having a low dielectric loss of  $2.0 \times 10^{-3}$ .

42. Canceled.

43. (Currently Amended) A ~~The dielectric substrate, according to claim 42, of the~~  
general formula  $\text{Sr}_2\text{RESbO}_6$ , further comprising:

5        ~~said RE being Neodymium;~~

~~said dielectric substrate being constructed of  $\text{Sr}_2\text{NdSbO}_6$ ;~~

~~said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \times 10^{-3}$ ;~~

~~said dielectric substrate being heated for at least 20 hours at between  $1400^\circ\text{C}$  and  $1600^\circ\text{C}$ ;~~

~~said dielectric substrate is constructed in a bulk form;~~

~~said dielectric substrate having an ordered perovskite pseudo-cubic tetragonal crystalline structure;~~

~~said dielectric substrate having a low dielectric constant of 10.6; and~~

15        ~~said dielectric substrate having a low dielectric loss of  $2.9 \times 10^{-3}$  without a phase transition.~~

44. (Withdrawn) The dielectric substrate, according to claim 42, wherein:

~~said dielectric substrate is constructed in a thin film structure;~~

20        ~~said dielectric substrate having a density GM/CC of 6.13;~~

~~said dielectric substrate having a low dielectric constant between 10.1 and 11.1; and~~

~~said dielectric substrate having a low dielectric loss of about  $2.9 \times 10^{-3}$ .~~

45. (Withdrawn) A thin film high  $T_c$  structure, comprising:

25        a plurality of thin films constructed of a compound of the general formula  $\text{Sr}_2\text{RESbO}_6$   
wherein RE is a rare earth metal;

~~said plurality of thin films being interspersed with a plurality of layers constructed of a copper oxide superconductor;~~

~~said plurality of thin films being deposited by pulsed laser deposition and being heated for~~

at least 20 hours at between 750° C to 825° C;

said plurality of thin films having a low dielectric constant;

said general formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ; and

5        said plurality of thin films having a low dielectric loss without a phase transition.

46. (Withdrawn) A thin film high critical temperature superconductor structure,  
according to claim 45, further comprising:

said plurality of thin films are constructed of  $\text{Sr}_2\text{LuSbO}_6$ ;

10        said plurality of thin films being heated for at least 20 hours at between 750° C to 825° C;

and

said plurality of layers are constructed of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ .

47. (Withdrawn) A thin film high critical temperature superconductor structure,  
15        according to claim 45, further comprising:

said plurality of thin films are constructed of  $\text{Sr}_2\text{LaSbO}_6$ ; and

said plurality of layers are constructed of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ .

48. (Withdrawn) An antenna, comprising:

20        a single layer of a copper oxide superconductor deposited onto a single crystal substrate  
of the formula  $\text{Sr}_2\text{LuSbO}_6$ ;

said single crystal substrate having a low dielectric constant;

said single crystal substrate having a low dielectric loss without a phase transition;

said formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ; and

25        said single layer of a copper oxide superconductor being patterned to complete the device;

49. (Withdrawn) A superconductor insulator superconductor step edge Josephson  
junction, comprising:

a single layer of a copper oxide superconductor deposited onto a single crystal substrate

of the formula  $\text{Sr}_2\text{YbSbO}_6$ ;

said single crystal substrate having a low dielectric constant;

said single crystal substrate having a low dielectric loss without a phase transition;

said single layer of a copper oxide superconductor being patterned;

5 a second layer of  $\text{Sr}_2\text{YbSbO}_6$  deposited onto said single layer of a copper oxide superconductor;

said formula including an  $\text{Sb}^{5+}$  constituent atom with a polarizability of about  $1.2 \text{ \AA}^3$ ; and

a second layer of a copper oxide superconductor deposited and patterned on said second layer of  $\text{Sr}_2\text{YbSbO}_6$ .

10 -49.

50. Canceled.